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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/761,486	01/16/2001	Wen-Chih Chiou	67,200-306	6239

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EXAMINER

MARKHAM, WESLEY D

ART UNIT PAPER NUMBER

1762

DATE MAILED: 09/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Advisory Action**

Application No.

09/761,486

Applicant(s)

CHIOU ET AL.

Examiner

Wesley D Markham

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--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 11 August 2003 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE. Therefore, further action by the applicant is required to avoid abandonment of this application. A proper reply to a final rejection under 37 CFR 1.113 may only be either: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114.

**PERIOD FOR REPLY** [check either a) or b)]

- a) ☐ The period for reply expires \_\_\_\_\_ months from the mailing date of the final rejection.
- b) ☒ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection. **ONLY CHECK THIS BOX WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).**

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

1. ☐ A Notice of Appeal was filed on \_\_\_\_\_. Appellant's Brief must be filed within the period set forth in 37 CFR 1.192(a), or any extension thereof (37 CFR 1.191(d)), to avoid dismissal of the appeal.
2. ☐ The proposed amendment(s) will not be entered because:
- (a) ☐ they raise new issues that would require further consideration and/or search (see NOTE below);
  - (b) ☐ they raise the issue of new matter (see Note below);
  - (c) ☐ they are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
  - (d) ☐ they present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: \_\_\_\_\_.

3. ☐ Applicant's reply has overcome the following rejection(s): \_\_\_\_\_.
4. ☐ Newly proposed or amended claim(s) \_\_\_\_\_ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
5. ☒ The a) ☐ affidavit, b) ☐ exhibit, or c) ☒ request for reconsideration has been considered but does NOT place the application in condition for allowance because: see the attached Office Action.
6. ☐ The affidavit or exhibit will NOT be considered because it is not directed SOLELY to issues which were newly raised by the Examiner in the final rejection.
7. ☐ For purposes of Appeal, the proposed amendment(s) a) ☐ will not be entered or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.

The status of the claim(s) is (or will be) as follows:

Claim(s) allowed: \_\_\_\_\_.

Claim(s) objected to: \_\_\_\_\_.

Claim(s) rejected: 1,2,5-7 and 9-17.

Claim(s) withdrawn from consideration: \_\_\_\_\_.

8. ☐ The proposed drawing correction filed on \_\_\_\_\_ is a) ☐ approved or b) ☐ disapproved by the Examiner.
9. ☐ Note the attached Information Disclosure Statement(s) (PTO-1449) Paper No(s). \_\_\_\_\_.
10. ☒ Other: See Continuation Sheet

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Continuation of 10. Other: The formal drawings (2 sheets, 5 figures) filed on 8/11/2003 are approved by the examiner.

### **DETAILED ACTION / ADVISORY ACTION**

1. Acknowledgement is made of the applicant's Request for Reconsideration filed on 8/11/2003 (with a certificate of mailing dated 8/6/2003). The applicant is thanked for providing a complete listing of the claims present in the instant application. Claims 1, 2, 5 – 7, and 9 – 17 are currently pending in U.S. Application Serial No. 09/761,486, and an Advisory Action follows.

### ***Drawings***

2. The formal drawings (2 sheets, 5 figures) submitted by the applicant on 8/11/2003 are approved by the examiner.

### ***Response to Arguments***

3. Applicant's arguments filed on 8/11/2003 have been fully considered but they are not persuasive.
4. Regarding the 35 U.S.C 103(a) rejections based on Plat et al. in view of Holscher et al., the applicant argues that the process of Plat et al. involves condensing the ARC layer to approximately the desired thickness and that "...condensing the ARC layer does not adversely affect the anti-reflective properties of the ARC layer", and therefore, Plat et al.'s process achieves a completely different result than that achieved by the present invention and is used for a completely different purpose than the method of the present invention.

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5. In response, the examiner notes that this argument is drawn to the Plat et al.

reference alone, while the rejections are based on the combination of Plat et al. and Holscher et al. Please note that one cannot show non-obviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Additionally, the examiner agrees with the applicant that the process of Plat et al. involves condensing the ARC layer to approximately the desired thickness and that "...condensing the ARC layer does not adversely affect the anti-reflective properties of the ARC layer". However, the applicant's claims are open to (i.e., do not exclude) the situation in which the ARC layer is condensed by the annealing process.

Further, Plat et al.'s teaching that the anti-reflective properties of the ARC layer are not adversely affected by the condensing (i.e., annealing) process does not mean or suggest that the properties are not changed / altered at all – it simply means that the properties are not detrimentally affected. For example and as noted by the applicant, the condensing step of Plat et al. decreases the thickness of the ARC layer, a process that would necessarily affect and alter the anti-reflective properties of an ARC (i.e., because the anti-reflective properties of an ARC are dependent on the thickness of the ARC itself). In addition, the examiner agrees with the applicant that the stated purpose of the annealing process of Plat et al. (i.e., condensing the ARC) is different from the stated purpose of the applicant's claimed process (i.e., to adjust the optical properties such as the refractive index (n) and/or extinction

coefficient (k) of the ARC). However, the examiner disagrees with the applicant's statement that Plat et al.'s process achieves a completely different result than the claimed process. Specifically, the combination of Plat et al. and Holscher et al. teaches all the process steps and limitations of the applicant's claims, including the type of substrate, the nature of the ARC (i.e., SiONH), the annealing temperature, the annealing time, and the type of gas used in the annealing process. Therefore, the method of the combination of Plat et al. and Holscher et al. would have inherently adjusted the optical properties, such as the extinction coefficient, of the ARC layer as claimed by the applicant. Please note that the fact that applicant has recognized another advantage (i.e., that an ARC annealing process such as the one taught by Plat et al. alters the optical properties of the ARC) which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

6. Second, the applicant argues that, in the present invention, the specific combination of the dielectric ARC layer / substrate surface is used to maximize the compatibility between the two, and Plat et al. is not concerned with such a compatibility problem. In other words, the applicant argues that Plat et al. does not teach the desirability or need to use other than SiON ARC material, while the present invention clearly shows the necessity of utilizing an SiONH or SiO<sub>2</sub> dielectric ARC layer. As support for this argument, the applicant cites page 3, line 8, through page 4, line 1, of the specification.

7. In response, the examiner disagrees with the applicant's assessment, specifically the applicant's statement that the present invention clearly shows the necessity of utilizing an SiONH or SiO<sub>2</sub> dielectric ARC layer. This is not the case. For example, the examiner reviewed page 3, line 8, through page 4, line 1, of the applicant's specification (i.e., the portion of the specification cited by the applicant), and this portion of the specification teaches that, for compatibility reasons, a dielectric type anti-reflective coating material is more suitable for coating the polysilicon or the silicon nitride surface. The applicant's specification does not assert or suggest that there is any criticality or compatibility advantage gained by using an SiONH or SiO<sub>2</sub> dielectric ARC (as presently claimed by the applicant) as opposed to an SiON ARC (as taught by Plat et al.). In fact, the applicant's specification specifically teaches that the dielectric ARC may be SiO<sub>2</sub>, SiON, or SiONH (page 3, lines 18 – 20), thereby contradicting the applicant's argument. The examiner also wishes to note that utilizing SiON as the dielectric ARC was originally claimed by the applicant (see, for example, originally filed Claims 2 – 4) but is no longer being claimed due to applicant's amendments. The examiner maintains that Plat et al., which teaches all of the applicant's process steps but uses an SiON ARC as opposed to an SiONH or SiO<sub>2</sub> ARC, and Holscher et al., which teaches the functional equivalence of an SiON ARC and an SiONH ARC, in combination, reasonably suggest each and every limitation of the applicant's claims.
8. Third, the applicant states that a rejection under 35 U.S.C. 103(a) must rest on a factual basis, and in the present case, the applicant argues that the conclusion

drawn by the examiner that the method of the combination of Plat et al. and Holscher et al. would have inherently adjusted the optical properties of the ARC layer is mere speculation and is not supported by solid evidence.

9. In response, the examiner disagrees with the applicant's position that the conclusion drawn by the examiner is mere speculation, and the examiner maintains that the process reasonably suggested by the combination of Plat et al. and Holscher et al. would have inherently adjusted the optical properties of the ARC layer. In support of this position, the examiner notes that the condensing step of Plat et al. decreases the thickness of the ARC layer, a process that would necessarily (i.e., inherently) affect and alter the anti-reflective properties of an ARC. In more detail, the thickness of an ARC layer (or any thin coating layer, for that matter) determines in what manner and to what extent light waves are refracted, reflected, absorbed, and transmitted as the light waves reach the ARC, thereby determining the anti-reflective (i.e., optical) properties of the ARC. Further, the examiner notes that the combination of Plat et al. and Holscher et al. teaches all the process steps and limitations of the applicant's claims, including the type of substrate, the nature of the ARC (i.e., SiONH), the annealing temperature, the annealing time, and the type of gas used in the annealing process. Therefore, the method of the combination of Plat et al. and Holscher et al. would have inherently adjusted the optical properties, such as the extinction coefficient, of the ARC layer as claimed by the applicant. If the applicant disputes this position, it is clear that some essential process step or limitation is missing from the applicant's claims that allows the



applicant's process to alter the optical properties of an ARC while the same process (i.e., the process suggested by the combination of Plat et al. and Holscher et al.) suggested by the prior art would not alter the optical properties of the ARC.

10. Fourth, the applicant argues that there is no motivation to combine Plat et al. with Holscher et al. because Plat et al. does not contain any teaching or suggestion that the SiON ARC layer is not compatible with the substrate surface, and Holscher et al. does not contain any teaching or suggestion that the SiONH ARC layer is especially compatible with certain substrate surfaces.
11. In response, the examiner disagrees with the applicant's statement that there is no reason or motivation to combine Plat et al. with Holscher et al. Briefly, Plat et al. teaches that a "conventional ARC layer" is provided on the polysilicon layer (Col.2, lines 47 – 49), and that the conventional ARC layer is typically SiON (Col.4, lines 38 – 39). However, the process of Plat et al. does not appear to be limited to solely a SiON ARC layer. Holscher et al. teaches the functional equivalence of a SiON dielectric ARC layer (i.e., as taught by Plat et al.) and a SiONH dielectric ARC layer (i.e., as claimed by the applicant) in the art of reducing reflections during the patterning of photoresist layers in semiconductor device applications (Col.2, lines 56 – 65). Therefore, it would have been obvious to one of ordinary skill in the art to substitute a SiONH dielectric ARC layer (i.e., as taught by Holscher et al.) for the SiON dielectric ARC layer in the process of Plat et al. with the reasonable expectation of (1) success, as SiON and SiONH dielectric ARC layers are chemically similar, and (2) obtaining similar results, specifically depositing a

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conventional ARC layer to a desired thickness on a polysilicon layer and then annealing the ARC layer to densify it, as desired by Plat et al. A substitution of art-recognized equivalents, such as substituting SiONH for SiON as an ARC, is a sufficient motivation to combine references and to support an obviousness rejection (See, for example, MPEP 2144.06). An express suggestion to substitute one equivalent component for another is not necessary to render such substitution obvious (*In re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982)).

12. Fifth, the applicant argues that the combined teachings of Holscher et al. and Plat et al. do not teach the invention contained in independent Claims 1 and 13, since neither reference recognizes the problem of compatibility, and therefore, neither reference provides such a solution, as provided by the present invention.
13. In response to this argument, the fact that applicant has recognized another advantage (i.e., that dielectric ARCs are especially compatible with and suitable for coating polysilicon and silicon nitride surfaces) which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). In other words, it appears to the examiner that the reason that Plat et al. and Holscher et al. do not discuss ARC "compatibility problems" at length is that the specific ARCs taught by Plat et al. and Holscher et al. (e.g., SiONH, SiON, etc.) are dielectric ARCs and do not have compatibility problems, an advantage of dielectric ARCs recognized by the applicant.

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**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D Markham whose telephone number is (703) 308-7557. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

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